Amendment to the Drawing

A replacement formal drawing is submitted consisting of FIGs 1, 2, 3, 4A, 4B, 4C, 5, 6A, and 6B on 9 sheets.

REMARKS

Upon entry of this Amendment, claims 13, 15, 18, 20 through 22, and 24 through 52 are pending. Pending independent claims include claims 13, 18, and 22. Claim 23 is cancelled. New dependent claims 33 through 52 are submitted.

The specification is objected to because headings and text are not in order.

The Draftsperson's review of the drawing indicates objections.

Claims 13, 15, 18, and 20 through 32 stand rejected under the judicially created doctrine of double patenting with reference to claims in U.S. patent 6,636,412 to Smith.

Claims 13, 15, 18, and 20 through 32 stand rejected under 35 U.S.C. §112 as indefinite because (a) they recite both an apparatus and the method steps of using the apparatus; and (b) it cannot be determined how to measure the claimed pulse width limitations. Claim 22 stands rejected under 35 U.S.C. §112 as indefinite. The Examiner has taken the position that recitations in the claim are not limitations having patentable weight because the recitations are essentially limitations of intended use.

Claims 15, 18, and 20 through 32 stand rejected under 35 U.S.C. §101 because each is directed to subject matter that is both a process and a machine.

Each of claims 13, 15, 18, and 20 through 32 stand rejected under 35 U.S.C. §102 as completely disclosed in "Human Effects Advisory Panel Report of Findings: Sticky Shocker Assessment" by *Kenny* et. al.

Each of claims 13, 15, 18, and 20 through 32 stand rejected under 35 U.S.C. §103 as obvious in view of a combination of the teachings of *Kenny*, U.S. Patent 5,801,617 to *Langnor*, U.S. Patent 5,457,579 to *Rothschild*, U.S. Patent 6,880,466 to *Carman*, and U.S. Patent 5,067,495 to *Brehm*.

The claims as amended traverse the Examiner's rejections. No new matter is submitted.

First Interview Summary

Applicant wishes to thank the Examiner for the courtesy extended in the interview held at the USPTO on June 16 2005 at which Examiners Michelle Clement (formerly Michelle Thompson), Troy Chambers, Gabe Sukman, and Dan Greene were present. An Agenda that describes the substance of the interview is included with this response. As to the change in filing

status, Examiner Clement agreed in principal and asked that a petition to correct the filing receipt be submitted. As to the addition of a figure showing a 1000 ohm resistor, a discussion among the Examiners present concluded that sufficient support exists in the priority application.

Applicant explained at the interview that references should be read with an appreciation of the effect of load resistance. Applicant also explained that references should be read with an appreciation that RMS currents will differ as a result of pulse width and pulse repetition rate differences even when measured into the same load resistance. To illustrate these and additional background for the record, Applicant submits the following:

For perfect rectangular pulses, power in watts is delivered according to the following expression. Note that this expression is independent of pulse width:

$$E \bullet N = (I_{RMS})^2 \bullet R \qquad \text{(Eq. A)}$$

where:

E = energy per pulse in joules
N = pulse rate in pulses per second
I_{RMS} = root mean square current in amps through a load resistance
R = load resistance in ohms

At 0.8 joules per rectangular pulse and 33 pulses per second, power (the rate of delivery of energy) is 26.4 watts (i.e., joules per second). This power into a load resistance of 1 KΩ (1000 ohms) produces I_{RMS} about 162 mA (consistent with FIG. 3 of the amended drawing filed herewith). The same power results from 1.76 joules per rectangular pulse and 15 pulses per second. If the same power is delivered into a lower load resistance, a higher RMS current would result as predicted from the product of RMS current and resistance in Eq. A.

Different values of resistance for tissue of a human target have been asserted to be valid including "500 - 1500 Ω" (*Jaycor* page D-8 line 30) and "around 250 ohms or less" (*Ragner* US Patent 5,698,815 at col. 5 line 30). Body resistance is said to be lower for higher frequency components (*Kenny* at page 25 line 8, contrasting body resistance assumed to be 1000 Ω, "At 2000 Hz, the resistance of the dry skin is ≈ 750 Ω.") and lower for higher currents (*Ragner* at col. 5 line 31, "higher currents produce lower internal body resistances"). Frequencies of interest to the present invention are greater than 10 KHz. For example, a rectangular pulse having a pulse width of 9 μsec into a reactive load may exhibit an oscillation (e.g., underdamped) having

a period of about 18 μsec corresponding to significant energy at about 55 KHz (the reciprocal of 18×10^{-6}).

For example, 0.8 joules per pulse at 15 pulses per second into a load resistance of 250 Ω indicates an RMS current of 219 mA.

For a repeating rectangular pulse (or an effective width of a nonrectangular pulse), peak current is related to RMS current by the following expression. Note that this expression is independent of load resistance:

$$(I_{PK})^2 = (I_{RMS})^2 / (W \bullet N) \qquad \text{(Eq. B)}$$

where:

I_{PK} = peak current in amps
I_{RMS} = root mean square current in amps through a load resistance
W = effective width in seconds
N = pulse rate in pulses per second

For a current of 162 mA RMS in pulses of 13 μsec (consistent with FIG. 3 of the amended drawing filed herewith) and 15 pulses per second, peak current would be about 11.6 amps. When such a peak current is maintained but pulse width decreases (e.g., lower load resistance provide a lower time constant), a lower RMS current results. For example, for a peak current of 11.6 amps in pulses of 10 μsec at 15 pulses per second, RMS current would be about 142 mA.

Finally for weapon circuits of the prior art and of the present invention, pulse width seems to be related to load resistance by the inductance of the output transformer that forms a time constant with the load resistance. Generally, lower load resistance results in shorter pulse width.

Second Interview Summary

Applicant wishes to thank the Examiner for the courtesy extended in the personal interviews on November 2, 2005. A draft of this response and supporting documents were discussed.

Amendment to the Drawing

FIG. 1 of the amended drawing is the same as FIG. 1 of the originally filed drawing and shows a second dart 20 and wire 21. Support for a second dart and wire is found, *inter alia*, at originally filed FIG. 2 of the present application and in the originally filed text such as at paragraph [0029] and [0030] of the marked up version of the substitute specification. No new matter is submitted in the amended FIG. 1.

FIG. 2 of the amended drawing is an amended version of originally filed FIG. 2 of the present application. Non-uniform signal flow is corrected.

Vague terminology for "primary transformer" and "output transformer" is omitted throughout the amended drawing and the substitute specification. Embodiments are discussed in the originally filed text of the present application that include several transformers performing a "primary" transformer function making the term "primary" incorrect as vague. All transformers have an "output" function rendering the terminology "output transformer" vague. Embodiments are discussed in the originally filed text of the present application that include several transformers performing an "output" transformer function, and "output transformers" not part of the weapon but part of a cartridge instead making the term "output" as to the weapon incorrect as vague. Deletion of vague terminology does not add new matter.

The relationship between wire 21 and transformer 14 is corrected. Support for FIG. 2 of the amended drawing is found, *inter alia*, at originally filed FIG. 2 of the present application and in the originally filed text such as at paragraphs of the marked up version of the substitute specification [0021] line 5, [0022] lines 4-5, [0023] lines 6-7, [0024] lines 5-6, [0025] lines 3-6, [0026] lines 4-5, and [0027] lines 4-5 each stating "a second conducting unit for transmitting electrical energy from the target to the apparatus" and in the originally filed claims. It is error to show on a block flow diagram the relationship between transformer 14 and wire 21 with reference to a "ground" of the weapon. Such a presentation may be appropriate for an electrical circuit schematic diagram, but is incorrect for a block flow diagram. FIG. 2 of the originally filed drawing and of the amended drawing is a block flow diagram, not an electrical schematic diagram. The "electrical energy" "transmitted" by wire 21 to "the apparatus" must complete a circuit with transformer 14 or the function of transformer 14 to step up the voltage of pulses from capacitor 14 cannot be accomplished. The correction is obvious from the type of diagram and no alternate presentation that is consistent with the text is possible. No new matter is submitted.

FIG. 3 as amended herein presents information from FIG. 4 of the present application as filed. FIG. 4 as filed was derived from Table I at pages 8 and 9 of the priority application. The rows of information in FIG. 3 are merely sorted to more clearly compare the present invention with the prior art weapons. The phrase "Claimed Invention" is amended to "Invention" to correct error (introduced when FIG. 4 was submitted) by reverting to the information as presented in Table 1 of the priority application.

FIGs. 4A, 4B, and 4C replace originally filed FIG. 3 and find support, *inter alia*, for example in originally filed FIG. 3 taken with the text of paragraphs [0041] through [0050] of the marked up version of the substitute specification. The functional blocks and relationships shown in FIGs. 4A, 4B, and 4C are as described in the priority application and the present application as filed. No new matter is submitted.

FIG. 5 (Prior Art) aid in understanding paragraph [0051] of the marked up version of the substitute specification. That paragraph admits a drawing. No new matter is submitted.

FIGs. 6A and 6B aid in understanding paragraphs [0052] through [0054] of the marked up version of the substitute specification. These paragraphs admit a drawing. No new matter is submitted.

Amendment to the Specification

Applicant provides with this response a substitute specification and a marked up version showing changes made with reference to priority application serial number 09/398,388 filed September 17, 1999. The amendments made here in the substitute specification merely correct grammatical and typographical errors made in the priority application and made worse in the immediate parent application serial number 10/016,082. The substitute specification traverses the Examiner's objection to the specification. No new matter is submitted. Support for changes made is discussed briefly below with reference to the enclosed marked up version of the substitute specification.

An amendment to the title is requested, replacing the title as filed in the subject application ("Hand-Held Stun Gun For Incapacitating A Human Target") with "Less Lethal Weapons And Methods For Halting Locomotion".

Paragraph [0001] of the marked up version of the substitute specification amends the relationship between the priority application, its intermediate continuation, and the present

application. The present application is not a continuation in part of the intermediate application serial number 10/016,082. The amendment herein to the relationship is proper because none of the differences between the priority application and the substitute specification shown in the marked up version add new matter with respect to the priority application. A petition for correction of the filing receipt to state the amended relationship between the priority application, the intermediate application, and the present application is filed concurrently with this response.

Paragraphs [0007] through [0009] of the marked up version of the substitute specification paraphrase the claims of the present application. The paraphrase does not include new matter.

Deleted paragraphs [0011] through [0013] of the marked up version of the substitute specification list the figures of the drawing as filed in the priority application. The drawing of the present application is amended as discussed above for several reasons including adding figures where the text admitted a drawing and arranging the figures to correspond with the flow of the text. No new matter is submitted in the brief description of the drawing paragraphs [0014] through [0020] as amended.

Paragraphs [0021] through [0027] of the marked up version of the substitute specification paraphrased claims originally presented in the priority application. These paragraphs are deleted from the beginning of the Detailed Description Of Preferred Embodiments.

In paragraph [0028] of the marked up version of the substitute specification, line 8, amending the description of the cartridge as being removably mounted "to" the housing as opposed to "in" the housing is supported, *inter alia*, for example by originally filed FIG. 1 that does not show housing 31 enveloping cartridge 37.

The deleted fourth sentence of paragraph [0032] of the marked up version of the substitute specification provides support for the added final sentence of that paragraph. Error in the logical sequence of description is corrected. No new matter is submitted.

Paragraph [0033] of the marked up version of the substitute specification is corrected for inappropriate colloquialism. A capacitor does not store voltage; it has a voltage as a consequence of storing charge. The energy available from a capacitor is given by the well known expression $E=1/2 * C *V^2$; where E is energy in joules, C is capacitance in farads, and V is voltage across the capacitor in volts. No new matter is submitted.

In paragraph [0040] of the marked up version of the substitute specification, the added statement, "Darts 18 and 20 are fired simultaneously." is supported, *inter alia*, for example at

deleted paragraph [0043] line 5 stating "Both the third and fourth darts are shot simultaneously, as are the darts in Fig. 2." No new matter is submitted.

Paragraph [0042] of the marked up version of the substitute specification finds support, *inter alia*, in deleted paragraph [0041] and refers to FIG. 4A of the amended drawing. No new matter is added.

Paragraph [0044] of the marked up version of the substitute specification finds support, *inter alia*, in deleted paragraph [0043]. No new matter is added.

Paragraph [0048] of the marked up version of the substitute specification finds support, *inter alia*, in deleted paragraph [0047] and refers to FIG. 4B of the amended drawing. No new matter is added.

Paragraph [0050] of the marked up version of the substitute specification finds support, *inter alia*, in deleted paragraph [0049] and refers to FIG. 4C of the amended drawing. No new matter is added.

Some of the content of deleted paragraphs [0021] through [0027] of the marked up version of the substitute specification is restated at paragraphs [0052] through [0054]. Paragraphs [0052] through [0054] at the end of the Detailed Description Of Preferred Embodiments present a paraphrase of claims 1, 2, and 3 of the priority application and find support in the text of the present application as originally filed, *inter alia*, for example, paragraphs [0021], [0022], and [0023] of the marked up version of the substitute specification. No new matter is submitted.

Double Patenting

To traverse the Examiner's double patenting rejection of this application, Applicant submits with this response a completed Terminal Disclaimer form PTO/SB/26.

Rejection Under §101 and §112

The Examiner has taken the position that claim 13, 15, 18, and 20-32 improperly recite an apparatus and a method for using the apparatus, a category not eligible for patent under §101. No proper construction of the claims can reach this conclusion. None of the claims claim both an apparatus and a method. The preamble of each independent claim 13, 18, and 22 states a claim to "a method performed by a weapon". Particular structures of the weapon (e.g.,

"capacitance" and "transformer") are recited in the amended claim. Dependent claims 15, 20-21, and 24-32 do not introduce a grammatically different preamble and are understood to be rejected only by relying on a rejected base claim.

Applying the rules of English grammar, the phrase in the preamble of each independent claim 13, 18, and 22 cannot possibly mean a weapon and a method performed by a user of a weapon. Each independent claim is drawn to the "method" statutory class and each element of the method comprises "operations" performed by an apparatus as opposed to "things".

Applicant's claims simply do not have the construction used in *Ex Parte Lyell* (17 USPQ 2d 1548), where the properly rejected claim stated in the preamble: "An automatic transmission tool in the form of a workstand ***and*** method for using same comprising" (Emphasis added). Note that in *Lyell* the workstand could not perform the method; the method was to be performed by a human operator.

Characterization of Claims as Methods of Use

In the explanation of the §112 rejection the Examiner has taken the position that claims 13, 15, 18, and 20-32 improperly recite methods of use. As to claim 22, the Examiner has taken the position that the phrase in the preamble "a method performed by a weapon" must be read as "a method" giving no patentable weight to the limitation "performed by a weapon". There is no basis for the Examiner's position. The Examiner's position is not a prima facie case of unpatentability for lack of eligible subject matter (e.g., not within the "useful arts" under, U.S. Constitution Art. 1 § 8 and §101).

The claims as amended fall within eligible subject matter under the statutes. Indeed, many a "business method" becomes eligible for patent by reciting that a computer performs part of the method (i.e. reciting a useful tangible environment as opposed to a merely human mental environment). Applicant desires to claim the method performed by a machine for several reasons including, *inter alia*, to minimize the recitation of structural limitations of the machine and to base infringement damages on a quantity of performances of the method. Because the claims as amended are eligible subject matter (methods are eligible under §101) as discussed above, and because the weapon is not mentioned exclusively in the claim preamble, every word of the claims must be given weight in examination.

The method claimed in each independent claim 13, 18, and 22 is not a method of using a weapon. A weapon (that is the entity performing the method) cannot use itself in the ordinary sense of a method of use. Nothing in the dependent claims changes the statutory category of the independent claims as methods, in particular, methods performed by a weapon.

The weapon that performs the claimed method is not a known weapon or a weapon made obvious by the prior art *inter alia* because it impliedly has structures that perform the method and the method is not known or made obvious by the prior art. As a generalization, new uses of old devices are not patentable as device claims. *In re Schreiber* 44 USPQ2d 1429, 1431 (Fed.Cir. 1997) ("It is well settled that the recitation of a new intended use of an old product does not make a claim to that old product patentable.") That generalization does not apply here, *inter alia*, because: (a) a method is being claimed, not a device; and (b) the new method is not performed by a person operating the device -- the device itself performs the new method. The recognized doctrine of slight changes, which limits application of that generalization, may apply, if device claims are presented, *inter alia*, because the device that is capable of performing the new method is itself different from the prior art.

Rejection Under §112

Each claim as amended is definite.

The Examiner has taken the position that the claims are indefinite for failing to recite where in the weapon performing the method the pulse width limitation can be measured. The amended claims traverse rejection. No new matter is submitted. Support for the claims as amended is found, *inter alia*, in the specification as quoted for convenience below.

The specification describes electrical characteristics at two places in the circuitry of a weapon: (1) from the capacitor into the transformer; and (2) from the transformer into a target or a load in place of the target. Quotations of the substitute specification for each of these places are as follows:

For circuitry from the capacitor into the transformer:

> **[0023]** Transformer 13 receives electricity from power 11 and produces a signal which causes 2,000 volts to be transmitted to capacitor 15. Once the voltage across capacitor 15 reaches 2,000 volts, it is able to discharge an electrical pulse into transformer 14.

The pulse from capacitor 15 is a 0.80 to 10 joule pulse, and has a pulse width of 9 to 100 microseconds. Capacitor 15 produces 2 to 40, preferably about 5 to 15 pulses per second. A 0.88 microfarad capacitor is presently preferred, although the size of capacitor 15 can vary as desired. The voltage across capacitor 15 can vary as desired as long as the capacitor produces a pulse having 0.90 to 10 joules, preferably 1.5 to 5.0 joules.

[0038] ... Capacitor 15 delivers energy in pulses from capacitor 15 to transformer 14. Capacitor 15 produces and delivers (at K) to transformer 14 from 0.75 to 10 joules in each pulse from capacitor 15.

[0040] ... The activation system is operated to contact the target with the first conducting unit and the second conducting unit, to deliver from the capacitor 15 to the transformer 14 pulses (at K) each containing 0.75 to 10 joules, and to deliver from the transformer to the first conducting unit electrical energy in pulses.

For circuitry from the transformer into a target or load:

[0024] Transformer 14 receives each pulse from capacitor 15 and produces a 50,000 volt pulse. The voltage of the pulse from transformer 14 can vary as desired as long as each pulse from transformer 14 has from 0.75 to 9 joules, preferably 1.0 to 3.0 joules, of energy, has a pulse width in the range of 10 to 100 microseconds, and has a current I_{RMS} ... **[0025]** ... in the range of 100 to 500 milliamps.

[0028] The profile of pulses used in prior art electric weapons is deficient in several respects. First, the energy produced by the pulses is in the range of 0.01 to 0.5 joule. This is outside the range of 0.9 to 10 joules required in each pulse produced in the apparatus of the invention. Second, the width of each pulse in prior art apparatus is about 1 to 7.5 microseconds. The pulse width in the apparatus of the invention must be 9 to 100 microseconds. Third, the current in each pulse produced by prior art apparatus is in the range of about 20 to 65 milliamps. The current in each pulse produced in the apparatus of the invention must be in the range of 100 to 500 milliamps. The pulses delivered to a target produce actual contractions of skeletal muscles sufficient to prevent use of the muscles by the individual subjected to the pulses.

[0039] ... The power supply produces electrical pulses which, if passed through a 1000 ohm resistor 27, which would have a pulse width (at M) greater than about 10 microseconds and a current in excess of 100 milliamps.

In the comparison of prior art stun gun output pulse widths and currents to the invention in FIG. 3 of the amended drawing filed herewith, all of the prior art stun gun data is measured into 1000 ohm load resistance in place of a human target. (see below discussion of *Kenny* Figure 5). By presenting data for the invention for comparison, the data for the invention is impliedly consistent with a 1000 ohm load resistance in place of a human target. For a pulse intended to be conducted by human body tissue, a 1000 ohm resistor was conventionally used in place of the tissue for measuring electrical characteristics of the pulse. For the ten prior art stun gun devices of FIG. 3, the measurements by Jaycor (*Jaycor* at p. D-9) into a 1000 ohm test load agree with the values quoted in FIG. 3 with the exception of the Jaycor Sticky Shocker reported (1) as 14 mA into 1 KΩ at a pulse width of 5 μsec (*Jaycor* at p. D-9), (2) as 54 mA into 1 KΩ at a pulse width of 1.0 μsec (*Kenny* p. 29), and (3) as 42 mA into 1 KΩ at a pulse width of 1.0 μsec (FIG. 3). Variation may be due to changes in the Sticky Shocker design.

In the explanation of the §112 rejection, the Examiner provides no support for the assertion that "lightning (sic), signal generators, car batteries, etc. can all be said to have the limitations disclosed and used in the same manner." Applicant disagrees. If the Examiner intends from that remark a rejection for law of nature (§101), lack of novelty (§102), or for obviousness (§103), the remark does not yet constitute a clear and complete *prima facie* rejection on one or more of those bases to which Applicant can respond.

Rejection Under §102

The Examiner has taken the position that each of claims 13, 15, 18, and 20 through 32 is anticipated by *Kenny* or the Executive Summary, Excerpt from Jaycor Report (pp. D-3 to D-33) hereafter *Jaycor*. The Examiner has not provided a *prima facie* case of unpatentability under section 102. The references cited by the Examiner are mischaracterized or misunderstood. The Examiner relies for support on *Kenny* at "the entirety of the report" and Figures 5, and 7 through 11. The Examiner relies on *Jaycor* at page D-7 through D-20, particularly pages D-8, D-12, D-27 and D-28.

Because each independent claim 13, 18, and 22 includes a combination of limitations not all found in one of *Kenny* or *Jaycor*, neither *Kenny* nor *Jaycor* anticipates any of the pending claims. The recited combination of limitations is not inherent in any one of these cited references or any one reference of record.

Kenny does not teach, *inter alia*, the combination of limitations "discharging 0.75 to 10 joules from the capacitance for 9 to 100 microseconds into a transformer of the weapon to generate a pulse" as recited in claim 13, "each recurring pulse has a pulse width from 9 to 100 microseconds and wherein the current has a magnitude of 100 to 500 milliamps RMS" as recited in claim 18, or "each recurring pulse has a pulse width of from 9 to 100 microseconds, and each pulse has from 0.75 to 10 joules of energy" as recited in claim 22.

Kenny discusses stun device electrical output at a target or load resistance and does not discuss the primary circuit of a transformer in which discharging takes place (claim 13) within a stun device. Nothing in *Kenny* teaches or suggests an electrical output necessarily implicating such discharging.

Further, *Kenny* does not discuss any electrical output having pulse width in the range 9 to 100 microseconds in combination with energy of 0.75 to 10 joules per pulse (claims 13 and 22); or pulse width in the range 9 to 100 microseconds in combination with current in the range 100 to 500 milliamps RMS (claim 18).

Kenny Figure 5 (page 15) appears to show an output pulse waveform of each of 7 prior art devices. Each of these waveforms has a pulse width less than 9 microseconds as shown graphically and in tabular data. Figure 5 apparently was copied from or derived from a common source used for the article by Edward Vasel, et al. of Jaycor, San Diego entitled "Sticky Shocker" and identified J203-98-0007/2990 (se IDS filed June 24, 2005) hereafter *Vasel*. In *Vasel* the pulse widths are shown in Figure 4 on page 4 entitled "Discharge Waveform Into 1000 Ohm Load". The same test results seem to be reported in tabular form in *Jaycor* at page D-9 Table 1. Rounded values from Table 1 at page D-9 were submitted by Applicant in the priority application as Table I and now FIG. 3 of the amended drawing filed herewith.

Pulse width is defined in *Kenny* as "time duration of a single pulse that does the work (or releases energy)" at page 16 line 11. Pulse width, as understood in the art at the time the priority application was filed, meant approximately the duration of the first monophasic portion of the output signal. *Kenny* follows this definition as is apparent for example, *inter alia*, from a comparison of the graphical representation of the Jaycor SS output and the Air Taser brand output (*Kenny* page 13 Figure 5) and the respective statements of pulse width of 1.0 microseconds and 5.4 microseconds (*Kenny* page 29 Figure 15).

Pulse width varies with load as is evident from the measurements by Robinson reported at *Jaycor* page D-10. Pulse width statements in the prior art must be construed in terms of what the skilled artisan would understand to be the point in the circuit where the stated pulse width was measured and the load on the circuit during the measurement. No pulse width statements in the art of record construed in this manner disclosed the claimed invention.

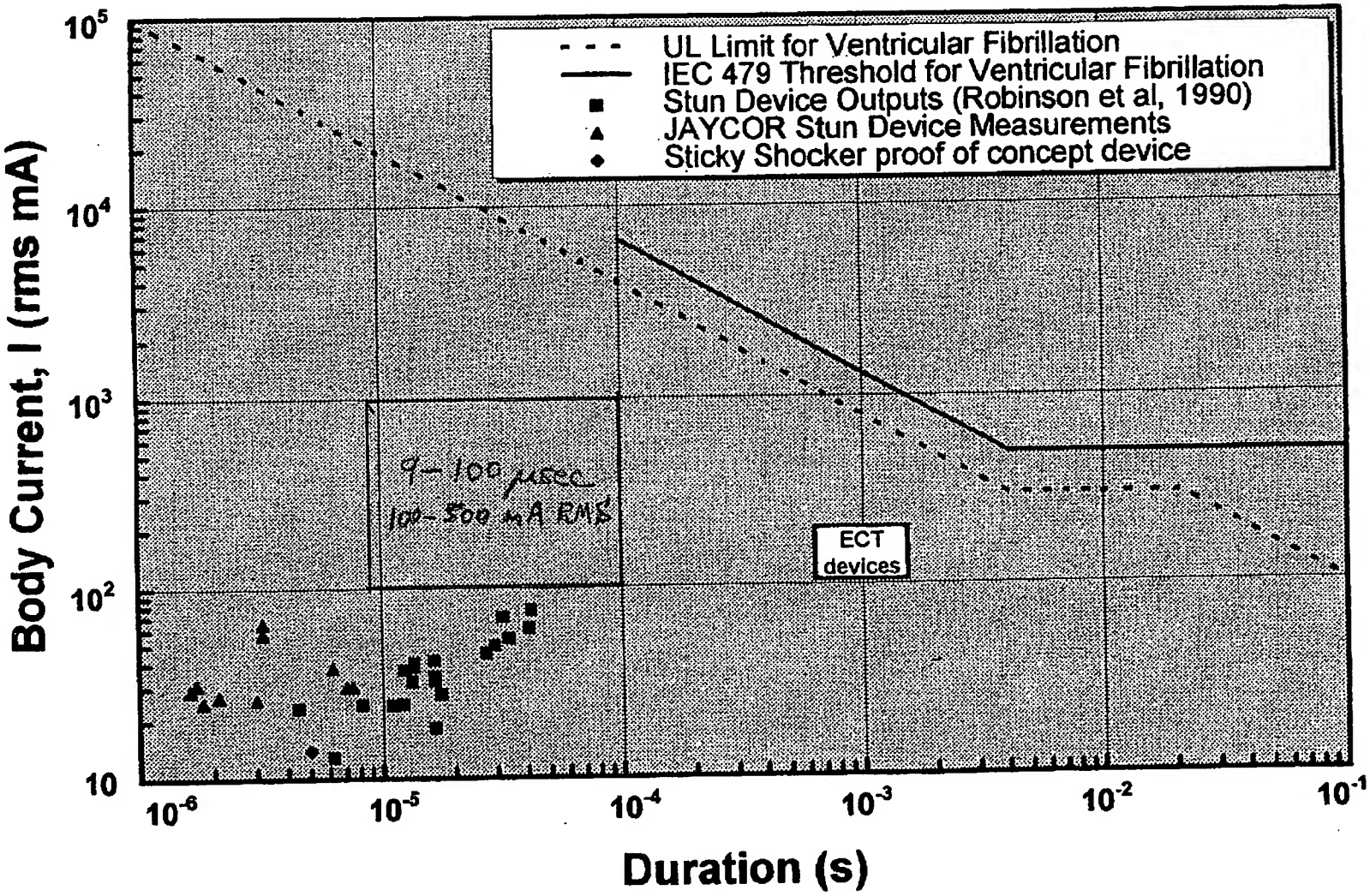
Kenny Figures 6 and 7 (page 16) report the energy per pulse produced by the Jaycor device (also shown in Figure 5) as from 0.1 to 0.3 joules. That energy is not within the claimed range of "0.75 to 10 joules".

Kenny Figure 8 (page 19) and Figures 9 and 10 (page 21) do not describe a method having the recited limitations of pulse width and energy or limitations of pulse width and current. These Figures generally describe nothing more than skeletal muscle and cardiac muscle responses for waveforms very different from the electrical limitations claimed by Applicant.

Jaycor discusses stun device electrical output at a target or load resistance and does not discuss the primary circuit of a transformer in which discharging takes place (claim 13) within a stun device. Nothing in *Jaycor* teaches or suggests an electrical output necessarily implicating such discharging. Further, *Jaycor* does not discuss any electrical output having pulse width in the range 9 to 100 microseconds in combination with energy of 0.75 to 10 joules (claims 13 and 22); or pulse width in the range 9 to 100 microseconds in combination with current in the range 100 to 500 milliamps RMS (claim 18).

While *Jaycor* states "Short pulse durations (1-10 μsec) appear to be effective at stimulating certain classes of nerve tissue, and generally are safer than longer pulses" (at page D-3) and states "All of the stun gun devices have an output consisting of a relatively low frequency (5 to 30 Hz) train of brief (1 to 40 μsec) pulses" (at page D-8), those statements are not with reference to any one combination of pulse width and energy meeting the claim language recited in claims 13, 18, and 22. Those statements are merely gross summarizations of the details presented in Table 2 on page D-10.

Further, the data in Table 2 on page D-10 does not show any stun gun device output characteristic having an energy per pulse greater than 0.26 joules measured into a 1000 ohm load. Consequently, none of the devices in *Jaycor* are capable of the power output implied by the claims that recite pulse width in the range 9 to 100 microseconds in combination with energy



Comparison of Electrical Output Characteristics of Stun Gun Devices to UL Limits and IEC Thresholds for Ventricular Fibrillation for Repetive Pulses of Brief Duration.

FIG. A

of 0.75 to 10 joules (claims 13 and 22); or pulse width in the range 9 to 100 microseconds in combination with current in the range 100 to 500 milliamps RMS (claim 18).

Jaycor pages D-7 through D-20 describe capacitive discharge pulse characteristics of stun gun devices. Figure 1, *Jaycor* page D-13, compares these devices to the IEC thresholds for ventricular fibrillation. In contrast the claimed combination of limitations is shown in the enclosed marked up version of Figure 1 identified here as FIG. A. FIG. A graphically demonstrates no overlap between the claimed limitation and prior art devices reviewed by *Jaycor*.

The *T'Prina* report (see IDS filed June 24, 2005) does not discuss any electrical output having pulse width in the range 9 to 100 microseconds in combination with energy of 0.75 to 10 joules (claims 13 and 22); or pulse width in the range 9 to 100 microseconds in combination with current in the range 100 to 500 milliamps RMS (claim 18). In the *T'Prina* report, waveforms are shown for the STG-1 on page 20 having pulse width about 12 μsec; and for the Pro-007 on page 22 having pulse width between 50 and 100 μsec. Additional measurement results are provided in Table 1 on page 4 including energy per pulse. All measurements were taken while the stun gun probes were in direct contact with a human target (e.g., skin as opposed to clothing) as explained on page 1 of the *T'Prina* report, as opposed to measurement into a load of 1000 ohms. On page 3 of the *T'Prina* report, a Taser brand device (prior to the present invention) is described as having "an energy output of 0.800 joules per pulse" however no pulse width measurements are discussed for this device in the *T'Prina* report.

No one reference of record teaches the combination of limitations recited in any of the pending claims. Consequently, the rejection under §102 must be withdrawn.

The Examiner has taken the position that the method of claim 22 occurs in nature (lightening), occurs with the use of a car battery, or occurs with the use of a signal generator. These assertions are not based on publications or evidence of record and are believed by Applicant to be false. The energy of a lightening strike to ground is not within the claimed pulse width, energy, or current ranges claimed. A car battery provides direct current. A person cannot experience the pulse width, energy, or current ranges claimed merely by touching its terminals. Applicant believes no signal generator or circuit of record meets the limitations of the claims when used for its intended purpose.

Rejection Under §103

The Examiner has taken the position that each of claims 13, 15, 18, and 20 through 32 is obvious in view of a combination of the teachings of *Kenny*, U.S. Patent 5,801,617 to *Langnor*, U.S. Patent 5,457,579 to *Rothschild*, U.S. Patent 6,880,466 to *Carman*, and U.S. Patent 5,067,495 to *Brehm*. *Carman* is not prior art because its priority application was filed June 25, 2002 several years after the present invention's priority application, filed September 17, 1999.

The Examiner has not made a *prima facie* case under §103 *inter alia* because the proposed combination does not include all of the limitations recited by Applicant. Further, there is no suggestion to combine the references as proposed by the Examiner. There can be no motivation to combine from a reference that teaches away from the combination. *In re Gurley* 31 USPQ 2d 1130, 1131 (Fed.Cir. 1994). As discussed below, each of these references teaches away from the proposed combination.

Langnor discloses a device for causing a person who has touched the device with a hand to immediately withdraw the hand from the device. Nothing in *Langnor* teaches any pulse width. According to *Langnor* pulses are formed by charging a capacitor to 2,000 volts and discharging the capacitor through a 1:20 step-up transformer so that current from the secondary winding flows through the person's hand. *Langnor* teaches a range of energies are suitable for deterring tampering:

> Presently, a 3 - 5 second duration is employed.
>
> The energy, approximately 0.5 Joules, and the voltage, 40,000 volts, of the discharge across the electrodes will force an intruder to withdraw his hand immediately but no injury will be inflicted. This device can deliver approximately 10 to 20 discharges per second. Electrical energy levels selected from between approximately 0.1 and 5 Joules impart no long-lasting detrimental injury to the tamperer. (col. 4 lines 43-50).

In the context of the entire paragraph, 0.5 joules per discharge, in the first sentence, seems to indicate energy per pulse. The reference to up to 5 joules in the last sentence does not expressly teach 5 joules per discharge. There is no indication that at 5 joules per pulse the intruder would not still have full control of his skeletal muscles to "withdraw his hand immediately". There is no indication that a particular energy per discharge is sufficient to halt locomotion.

Langnor teaches away from halting of locomotion by the intruder by teaching that up to 5 joules of energy per pulse may be used to "force the intruder to withdraw his hand immediately but no injury will be inflicted". A person of ordinary skill in the art seeking to halt locomotion would have no motivation to use pulses up to 5 joules in light of the teaching of *Langnor*.

Nothing in *Langnor* teaches a pulse width that halts locomotion by the target. *The effect to "halting locomotion is not inherent in Langnor because no pulse width is taught by Langnor.* Consequently, the teachings of *Langnor* are not sufficient to produce the effect discovered by Applicant. Nothing in *Langnor* would lead to the combination of ranges claimed by Applicant.

Rothschild discloses a device having a circuit optimized for "incapacitation ability" (col. 4 lines 15-26). Pulses that are intended to impart a shock to a person are described as pulse length about 1 millisecond (i.e., 1000 microseconds), 0.43 milliamps per pulse, and a voltage of 50 to 120KV (col. 4 lines 8-10 and 44-51). Consequently, the teachings of *Rothschild* are not sufficient to produce the effect discovered by Applicant. Nothing in *Rothschild* would lead to the combination of ranges claimed by Applicant. *Rothschild* teaches away from halting locomotion by a target by teaching that "higher output voltage and higher pulse" enhance the snapping sound and the brilliance of the arc. *Rothschild* teaches away from halting locomotion by a target by teaching a sparking apparatus used as a stun gun or prod to merely "subdue", "arrest", "defend against", "repel", "repulse", and "intimidate".

Brehm discloses a method for relieving pain using electrodes that apparently cause a pulsed current to flow through tissue. *Brehm* is not art an ordinary designer would consider to solve the problem solved by Applicant (e.g., weapon technology for halting locomotion). An ordinary designer pursuing weapon technology with an understanding of the conventional importance of pain compliance weapons would not look to technology for the relief of pain. Assuming *arguendo* that *Brehm* could be prior art, the pulses there have monophasic shape, 190 microseconds duration, and current from 15 to 100 milliamps. Pulses recur at from 104 to 180 per second. Nothing in *Brehm* teaches a pulse current that halts locomotion by the target. Nothing in *Brehm* would lead to the combination of ranges claimed by Applicant. *Brehm* teaches away from halting of locomotion by teaching a therapy for the relief of chronic pain which could fairly be understood to enhance patient locomotion by the relief of pain.

The combination of teachings proposed by the Examiner does not perform the functions nor include the combination of limitations taught by Applicant. Assuming *arguendo* that the

proposed combination could be found, the Examiner has not identified a proper suggestion to combine. The statements and passages relied upon do not suggest both selecting ***and*** combining prior art waveform attributes in a way Applicant recites in the claimed limitations.

Applicant has carefully reviewed the references as requested by the Examiner. There is no explicit suggestion in any of the references.

The Examiner proposes three bases for finding suggestion from the knowledge of one skilled in the art. First, the Examiner states "Clearly those in the art of applying electrical shock to the human body are fully aware of the various waveforms and power levels required to perform their intended result." This statement is false, *inter alia* because at the time the invention was made by Applicant, persons of ordinary skill in the art of electronic weapons were not aware of a solution to the anomaly that some targets were not stopped by the signal of the prior art stun guns. Halting locomotion of motivated individuals is not described anywhere as a suitable test or as an intended result. There is no indication of a waveform sufficient to produce that intended result.

Second, the Examiner states "it does not seem beyond the knowledge level [of] one of ordinary skill in the art to review the various figures and comments of this report [referring to *Kenny*] to arrive at the instant invention." This statement is also false, *inter alia* because persons of ordinary skill in the art, at the time of filing the priority application, mistakenly believed that the waveforms and power levels caused "tetanous" for current paths between the electrodes and caused "incapacitation" when they did not know these waveforms and power levels did not cause "halting locomotion by the target" for a motivated target. On the contrary, the superlative descriptions (e.g. "incapacitate", "tetanous") by experts in the field would have indicated to a skilled person at the time of the Applicant's invention that the known results accomplished by known techniques were all the "incapacitation" that could be expected safely and across a wide population of human subjects.

-As one commentator explains, "Courts have ruled that the obviousness of a new product is not to be judged solely by the structural modification or difference from the products in the prior art (or in the case of a process by the changes in operational steps). A "simple" or "slight" change may be nonobvious if the change achieves a new function or solves a known problem the source of which the art had not theretofore recognized. (*Eclipse Corp. v. Ford Motor Co.*, 171 USPQ 513, 517 (7th Cir. 1971), *cert. denied*, 406 U.S. 948 (1972) ("the fact that the solution to a

problem is simple or appears so when viewed in retrospect does not mean the solution was obvious when it was conceived")." (*Chisum*, [("Chisvmon Patents", §5.04[7]).

In *Kenny* there is expressed only a limited understanding of "waveforms and power levels" and statements that further research is needed. *Kenny* quotes *Murray & Resnick* (see IDS filed June 24, 2005) but disputes their claims of "incapacitation" and their theories of "incapacitation". (*Kenny* page 30 lines 3-5; page 26 line 26 through page 27 line 18). These statements by *Kenny* do not provide "suggestion" sufficient for making the *prima facie* case for rejection of the specific combination of limitations of the pending claims. The panel in *Kenny* defined tetanus as fusion of twitches, considered data regarding tetanus of grip muscles of hands and feet, considered data of Figure 11 regarding fusion of twitches for pulse widths of 100's of milliseconds (not within claimed range of 9 to 100 μsec), observed that there is no data regarding tetanus for larger muscle groups, observed that a Taser device (prior to the present invention) with pulse width of 5.4 μsec into 2KΩ (Figure 15) caused partial tetanus not including the arms, did not consider waveforms for "halting locomotion", and concluded that a minimal effective current for effective immobilization was unknown.

> When a succession of [action potentials] are produced on the motor neuron, the individual twitch quanta fuse together. (page 19 line 3 et seq.). This phenomena is known as "can't let-go", or tetanus. ... Tetanus can also be achieved with high current levels. ... [Figure 8] illustrates the "let-go" thresholds of small muscle groups (i.e. hands and feet). There is no data available for the "let-go" thresholds of larger muscle groups. ... Figure 11 illustrates the effect of pulse repetition on muscle tension of a motor neuron. (page 22 line 5). ... According to experiments conducted by John Cover, the Taser's inventor, the electrical current causes partial tetanus when the electrodes are 6 or more inches apart ... (page 26 line 28-30). ... The subject is able to break his fall with his hands. The subject is not totally immobilized, since only the portion of the muscles in direct electrical contact between the darts are affected. (page 27 lines 14-16). Studies are needed to identify the minimal range of currents that can be sensed by a human and the minimal effective current for immobilization. No data is available to the Panel to indicate whether the currents and voltage used in the Taser and Sticky Shocker are close to, or far above the minimal effective values. (page 38 lines 16-19). ... The Final Technical Report admits, "there is little authoritative medical research on the subject of shock effectiveness for pulse wave technology." (page 53 lines 27-29).

Third, the Examiner relies on the statement, "Tetanus can also be achieved with high current levels." quoted above. That statement does not provide suggestion to use, *inter alia*, pulse widths in the claimed range of 9 to 100 μsec. That statement is insufficient to provide the necessary suggestion to select the references and combine them in a way to make the claimed invention obvious. At best, the statement is but an invitation to scientists to explore a new technology that seems a promising field of experimentation. The statement is of the type that gives only general guidance and is not at all specific as to the particular form of the claimed invention and how to achieve it. Such a suggestion may make an approach "obvious to try" but it does not make the invention obvious. *Ex parte Obukowicz* 27 USPQ 2d 1063 (B.P.A.I. 1992). The mere fact that a person of ordinary skill in the art would have the capabilities to arrive at the invention does not make the claimed invention obvious. *Ex parte Lavengood* 28 USPQ 2d 1300, 1301-1302 (B.P.A.I 1993).

The mere fact that the prior art may be modified in the manner proposed by the Examiner does not make the modification obvious *unless* the prior art suggested the desirability of the modification. *In re Fritch* 23 USPQ 2d 1780, 1783-1784 (Fed.Cir. 1992) Here, the prior art did not indicate the desirability of the combination of limitations claimed by Applicant. The prior art is entirely silent as to a beneficial result that could be expected from the combination of limitations claimed by Applicant.

Knowledge of the person of ordinary skill in the art does not provide suggestion to combine teachings of references in Applicant's case because the knowledge itself teaches away from the combination or modification suggested by the Examiner. Increasing energy per pulse and/or increasing pulse width to the ranges claimed by Applicant would not have been attempted in light of one or more of the following: (1) the lack of scientific data (e.g., see *Kenny* at page 38 "where the pulse duration is ... 1-3 micro-seconds ... [t]here is no scientific data available to the HEAP to describe the effects of theses impulses, i.e. the limits of sensation, let-go current, etc.; (2) the perceived risk of ventricular fibrillation; and (3) advice of experts to the contrary (e.g., *Jaycor* at D-3 "Short pulse durations (1-10 μsec) appear to be ... safer than longer pulses."). *US v. Adams* 148 USPQ 479, 484 (1966) ("known disadvantages in old devices which would naturally discourage the search for new inventions may be taken into account in determining obviousness").

Both the suggestion and reasonable expectation of success must be found in the prior art. *In re Dow Chemical* 5 USPQ 2d 1529, 1531 (Fed.Cir. 1988). Assuming, *arguendo*, that suggestion could be found, here there was no expectation of success known at the time the present invention was made by Applicant.

When the incentive to combine the teachings of the references is not readily apparent, it is the duty of the Examiner to explain why the combination of the reference teachings is proper. Absent such reasons or incentives, the teachings of the references are not combinable. Failure to identify the necessary suggestion or motivation to combine the references will create a presumption that the combination of references selected by the Examiner is based on impermissible hindsight. (see *In re Rouffet* 47 USPQ 2d 1453, 1458 (Fed.Cir. 1998))("Because the Board did not explain the specific understanding or principle within the knowledge of a skilled artisan that would motivate one with no knowledge of [the claimed invention] to make the combination, this court infers that the Examiner selected these reference with the assistance of hindsight.")

Other Insufficient Bases of Rejection

The Examiner's attention is drawn to the following prior art teachings mentioning pulse width. None of these teachings taken independently or in combination with the bases discussed above amount to a *prima facie* case of lack of novelty nor a *prima facie* case of obviousness due to, *inter alia*, the lack of teaching of the combination of limitations recited by Applicant in the pending claims and lack of suggestion and expectation of success discussed above.

McNulty (U.S. Patent 5,831,199) mentions power output in a range from 1.2 to 2 joules per pulse but teaches a pulse width of 4 microseconds throughout the disclosure. *McNulty* also teaches away from currents greater than 70 mA.

> The power output range that will not cause ventricular fibrillation in a normally healthy person, but is sufficient to allow a an adequately penetrating pulsating arc that will "freeze" the target to the circuit at wire ranges exceeding 15', is an average wattage between 12 and 20 watts at 1.2 to 2 joules/pulse.
>
> The calculated effective current of the TASER as currently manufacture, is 10 mA, but the threshold for inducing ventricular fibrillation in a normally healthy adult human is between 70-100mA. (col. 12 lines 12-21).

Ragner (US Patent 5,698,815) discloses higher power stimulus pulses combined with defibrillation pulses:

> After several shocks, switch 58 changes the polarity of the current going to the electrodes. This is done to prevent infection of the puncture wounds. By switching polarity every few pulses, hydrogen peroxide is produced at each electrode to disinfect the wound area. After several seconds of pulses the pulses stop. Then a few seconds later a single pulse is given. This is in case the target's heart has gone into fibrillation (not a problem if power is kept below potentially lethal levels). By providing this defibrillating pulse much higher power levels can be used. In fact, the pulse nature of the electric output would itself tend to defibrillate the target. A few seconds after the first defibrillating pulse one or more additional pulses are applied. These electrical pulses leaves the target immobilized, and possibly unconscious.
>
> FIG. 4 shows one possible current output for the stun bullet. Stun pulses 112 are each only a few tens of microseconds in duration with as many as 500 pulses per second (approx. 12 pulses per second shown in FIG. 4). The pulses are shown switching polarity every half second. Defibrillating pulses 114 and 116 are applied several seconds after the initial stun pulses to stop heart defibrillation if it has occurred. (col. 12 lines 13-33).
>
> One-half joule pulses firing at thirty pulses per second is also well above the non-lethal range of electric shock if the heart is placed in the circuit. At these high power levels a defibrillating pulse 114 (see FIG. 4) would be used ... (col. 9 lines 5-8).

Ragner teaches that power above 0.5 joules per pulse should be avoided to avoid fibrillation.

Murray & Resnick (see IDS filed June 24, 2005) describes tests of products by TASER Systems Inc.

> A number of test have been run upon the effectiveness of very short duration shocks repeated at repetition frequencies of three per second and higher, and at energy levels corresponding to one tenth to one hundredth of the value corresponding to the maximums safe non-fibrillation level as given by the references under I., above. The results show that short duration shocks at .0001 to .00001 seconds are just as incapacitating as steady state currents, provided that they satisfy the desired energy outputs and are repeated fast enough to overpower conscious or reflex reactions.
>
> In addition, tests have been made in which currents were passed from point to point on the limbs, torso and head to evaluate

> the pain threshold, muscular involvement, and response. These tests showed that pulsed shocks having energy in the range of 0.1 to 0.5 joules per pulse are so painful and cause such extreme muscular contractions along the current path that they are not only incapacitating, but cause uncontrollable reflex action of the hands and arms (if not paralyzed by the shocks) such that the point(s) of current entry are grasped. (page 232)

These tests indicate that the target has control of skeletal muscles (i.e., to grasp). Nothing teaches or suggests "halting locomotion". Again, 0.5 joules per pulse is indicated as sufficient; teaching away from higher power levels.

The pending claims are not made obvious in light of any of the prior art of record (the prior art discussed above believed to be the closest) because a presumption of obviousness is traversed for one or both of the following reasons. First, the combinations of ranges claimed by Applicant are *critical* to "halting locomotion" by a human or animal target. Criticality is discussed in the specification as originally filed and in the declaration of Patrick Smith, enclosed and discussed below. Second, the closest prior art *teaches away* from the combinations of ranges claimed by Applicant.

A *prima facie* case of obviousness is made out when at least one value in the claimed range is shown by the prior art. *Haynes Int'l., Inc. v. Jessop Steel Co.* 28 USPQ2d 1652, 1655 n.3 (Fed.Cir. 1993). Here, however, because the ranges taken together accomplish the desired effect, no one reference includes or suggests a combination that overlaps the range limitations as claimed. More than one range must be found to overlap to constitute obviousness of the claim as a whole. Since the references do not include overlap of all ranges claimed by Applicant, no *prima facie* case of obviousness has been made.

Ranges which overlap or lie inside ranges disclosed by the prior art may be patentable if the applicant can show criticality in the claimed range by evidence of unexpected results. *In re Wertheim* 191 USPQ 90 (CCPA 1976). When unexpected results are used as evidence of nonobviousness, the results must be shown to be unexpected compared to the closest prior art. *In re Baxter Travenol Labs* 21 USPQ2d 1281, 1285 (Fed.Cir. 1991), *In re Soni* 34 UYSPQ2d 1684 (Fed.Cir. 1995) ("When an applicant demonstrates substantially improved results and states that the results were unexpected, this should suffice to establish unexpected results in the absence of evidence to the contrary.") Here, complete halting of locomotion (as opposed to "partial

incapacitation" as in the prior art) was accomplished according to the combination of limitations claimed by Applicant.

The discovery of an optimum value of a variable in a known process is presumed to be obvious if it is discovered through routine experimentation. *In re Aller* 105 USPQ 233, 235 (CCPA 1955). This presumption is traversed when: (1) the variable to be optimized was not recognized to be a result-effective variable and the prior art did not suggest optimizing the variable optimized by the invention; ***or*** when (2) the results of optimization were unexpectedly good. *In re Antonie* 195 USPQ 6, 9 (CCPA 1977) and *In re Glaug* 62 USPQ2d 1151 (Fed.Cir. 2002). Here, the process of halting locomotion was not known. Assuming, *arguendo*, that the process was known except for optimization, the experimentation needed to accomplish optimization was not routine ***and*** the results were unexpectedly good. Applicant departed from routine experimentation for improved pain compliance weapons by studying muscle contractions in *anesthetized* animals incapable of responding to pain. The results were unexpectedly good because halting locomotion could be accomplished without cardiac fibrillation. (see enclosed declaration of Patrick Smith). In the claimed invention, a combination of ***more than one variable*** was found to accomplish unexpectedly good results.

Conclusion

Reconsideration is respectfully requested. Applicant believes the case is in condition for allowance and respectfully requests withdrawal of the rejections and allowance of the pending claims.

The Examiner is invited to telephone the undersigned at the telephone number listed below if it would in any way advance prosecution of this case.

Respectfully submitted,

Date: 11/8/2005

William R. Bachand
Reg. No. 34,980

TASER International, Inc. Legal Dept.
17800 N. 85th Street
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(480) 905-2091
Customer No. 49754

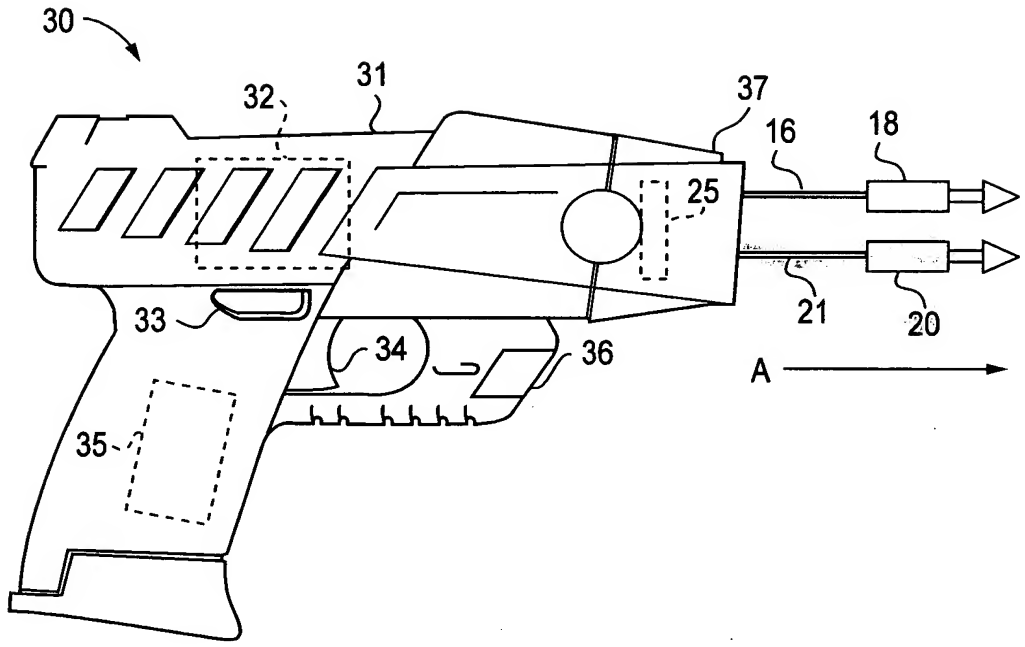

FIG. 1

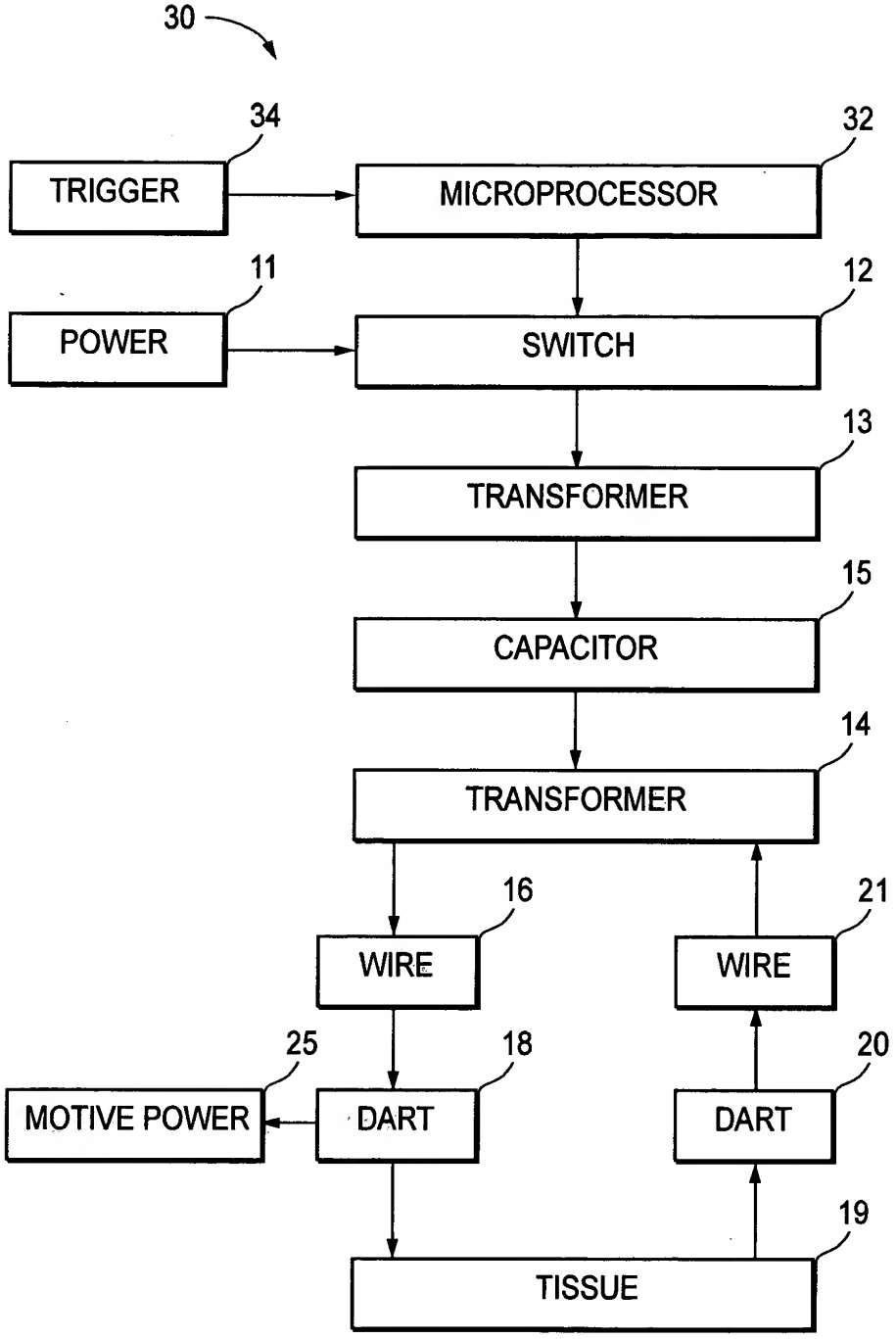
30
34
TRIGGER
32
MICROPROCESSOR
11
POWER
12
SWITCH
13
TRANSFORMER
15
CAPACITOR
14
TRANSFORMER
16
WIRE
21
WIRE
25
MOTIVE POWER
18
DART
20
DART
19
TISSUE

FIG. 2

BRAND	PULSE AMPLITUDE (mA RMS)	PULSE WIDTH (μSEC)
JAYCOR SS	42.0	1.00
ZFORCE I	29.0	1.60
Z FORCE III	31.9	1.69
ZFORCE IV	25.3	1.81
TP65kV	26.8	2.07
TP120kV	25.7	3.03
MYOTRON	64.7	3.20
Om120kV	38.2	6.17
Om150kV	29.6	7.13
Om SB	29.8	7.52
INVENTION	162.48	13.00

FIG. 3

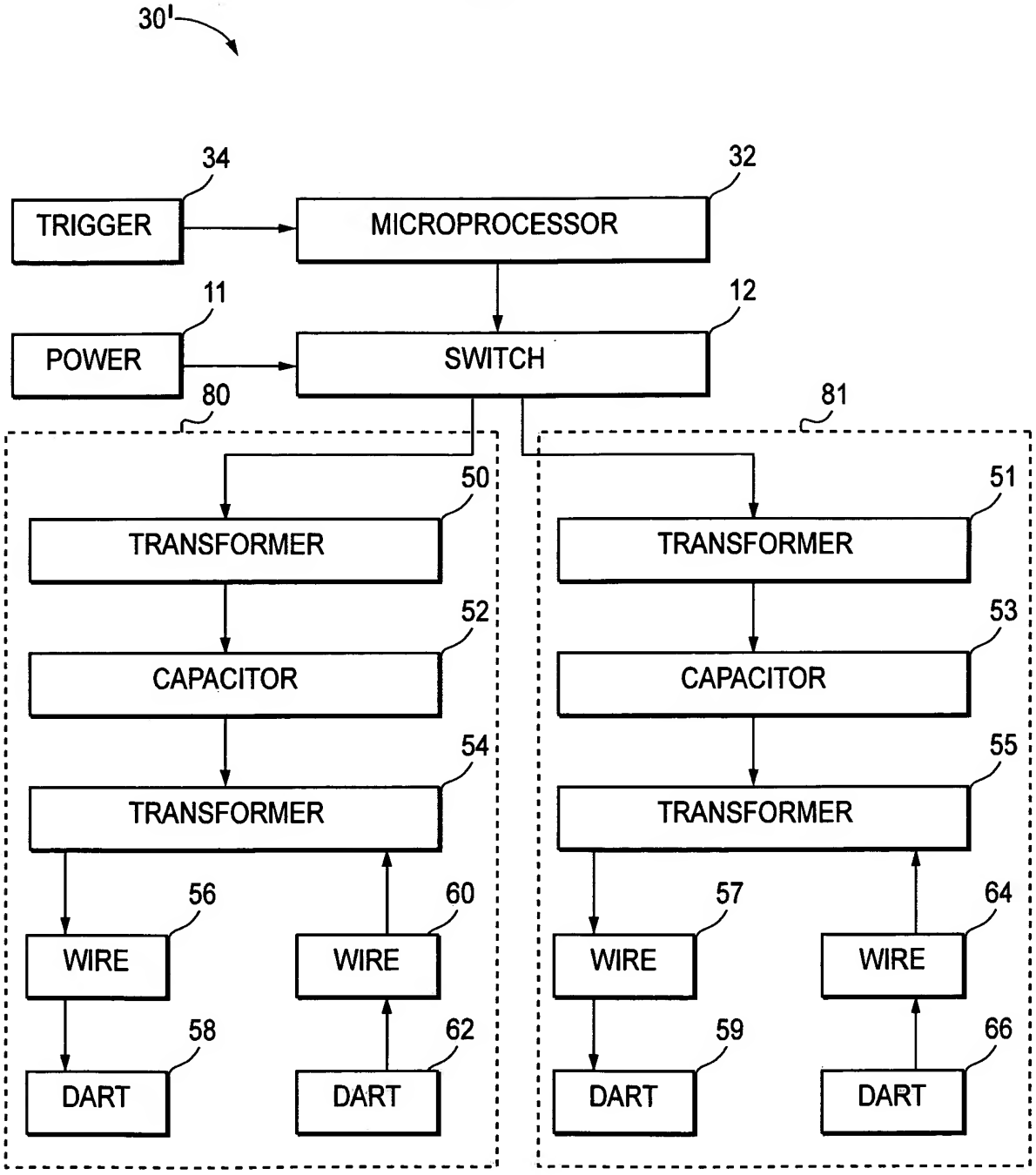
30'
34
TRIGGER
32
MICROPROCESSOR
11
POWER
12
SWITCH
80
81
50
TRANSFORMER
51
TRANSFORMER
52
CAPACITOR
53
CAPACITOR
54
TRANSFORMER
55
TRANSFORMER
56
WIRE
60
WIRE
57
WIRE
64
WIRE
58
DART
62
DART
59
DART
66
DART

FIG. 4A

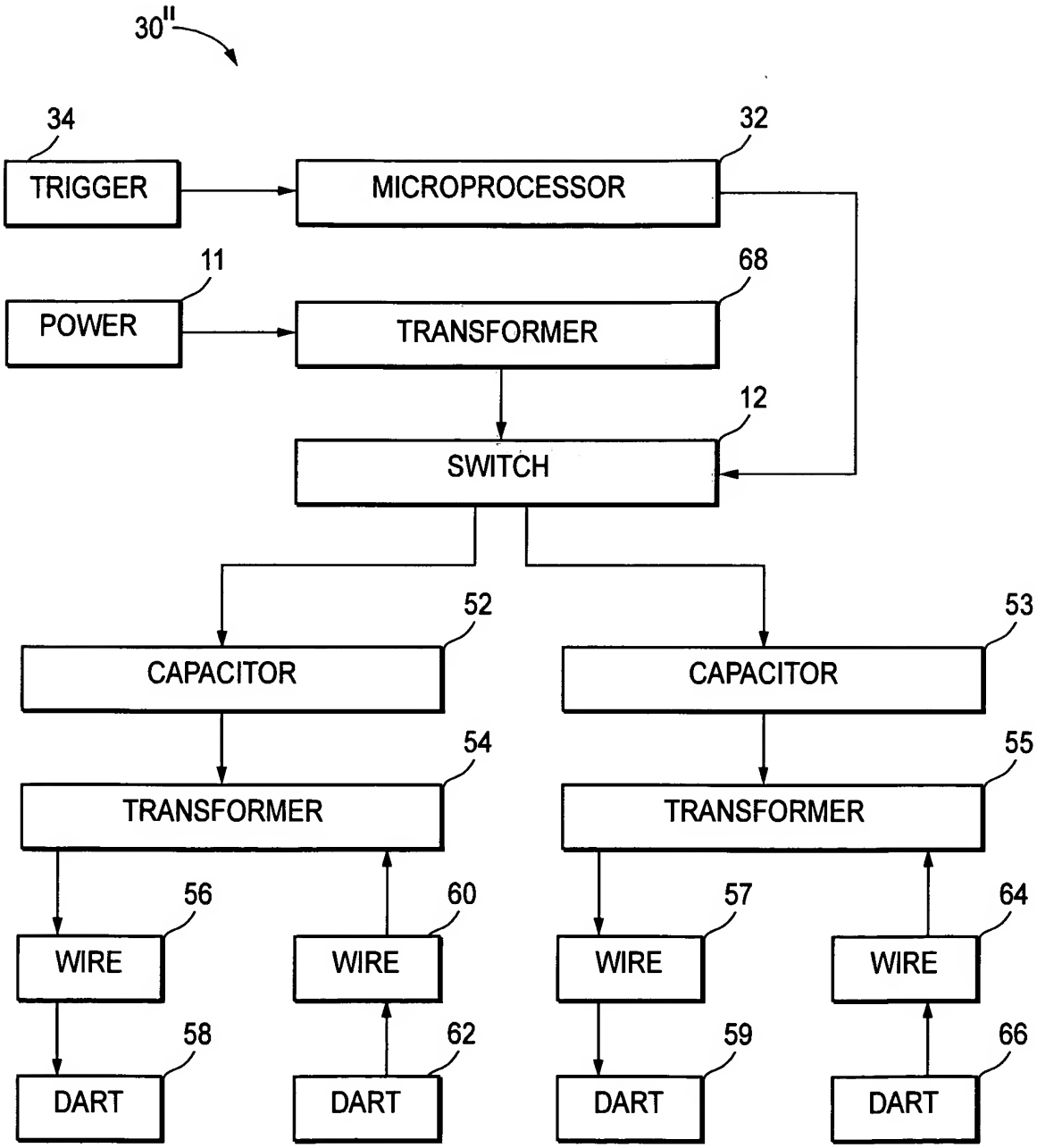
30"
34
TRIGGER
32
MICROPROCESSOR
11
POWER
68
TRANSFORMER
12
SWITCH
52
CAPACITOR
53
CAPACITOR
54
TRANSFORMER
55
TRANSFORMER
56
WIRE
60
WIRE
57
WIRE
64
WIRE
58
DART
62
DART
59
DART
66
DART

FIG. 4B

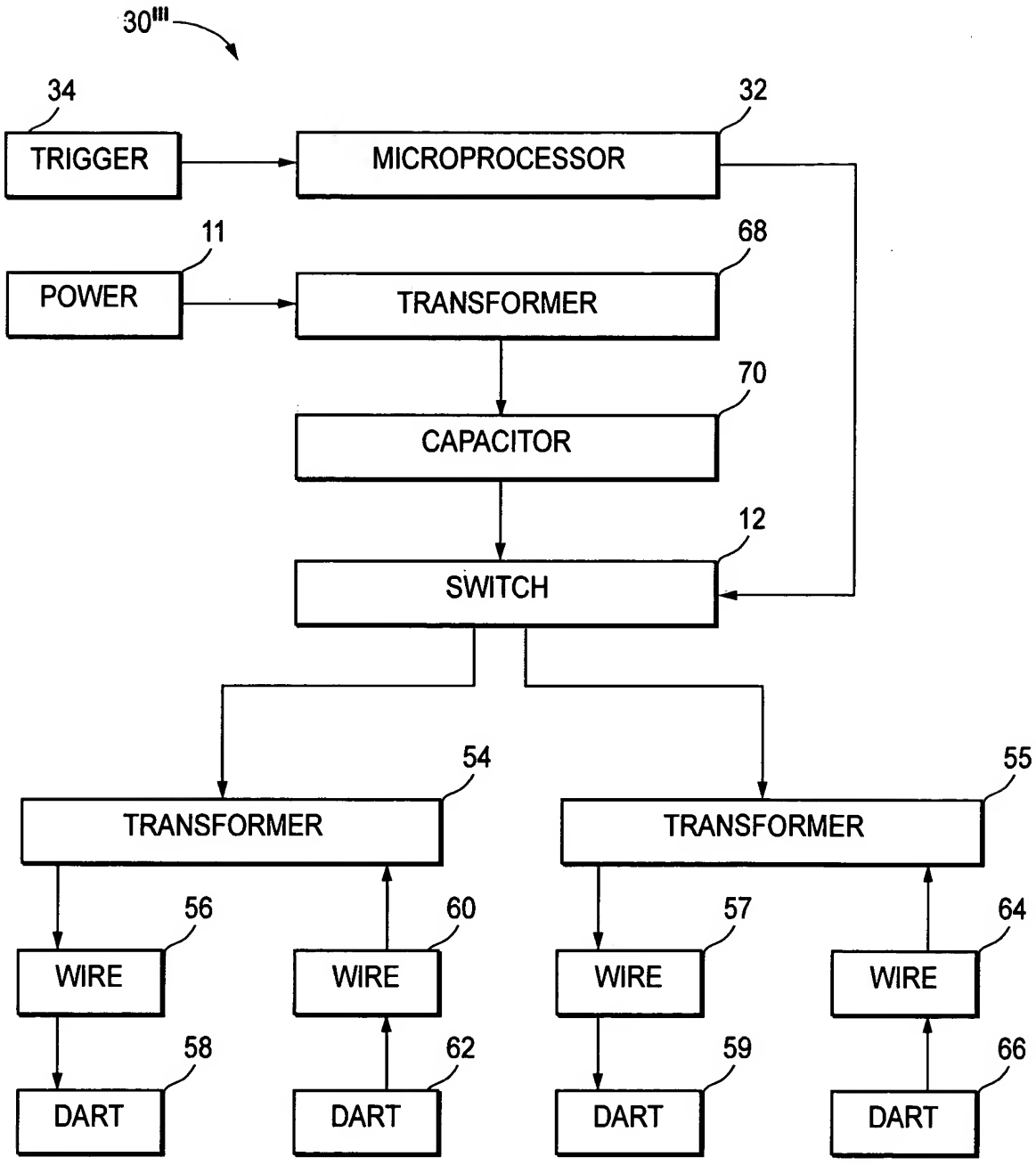
30III
34
TRIGGER
32
MICROPROCESSOR
11
POWER
68
TRANSFORMER
70
CAPACITOR
12
SWITCH
54
TRANSFORMER
55
TRANSFORMER
56
WIRE
60
WIRE
57
WIRE
64
WIRE
58
DART
62
DART
59
DART
66
DART

FIG. 4C

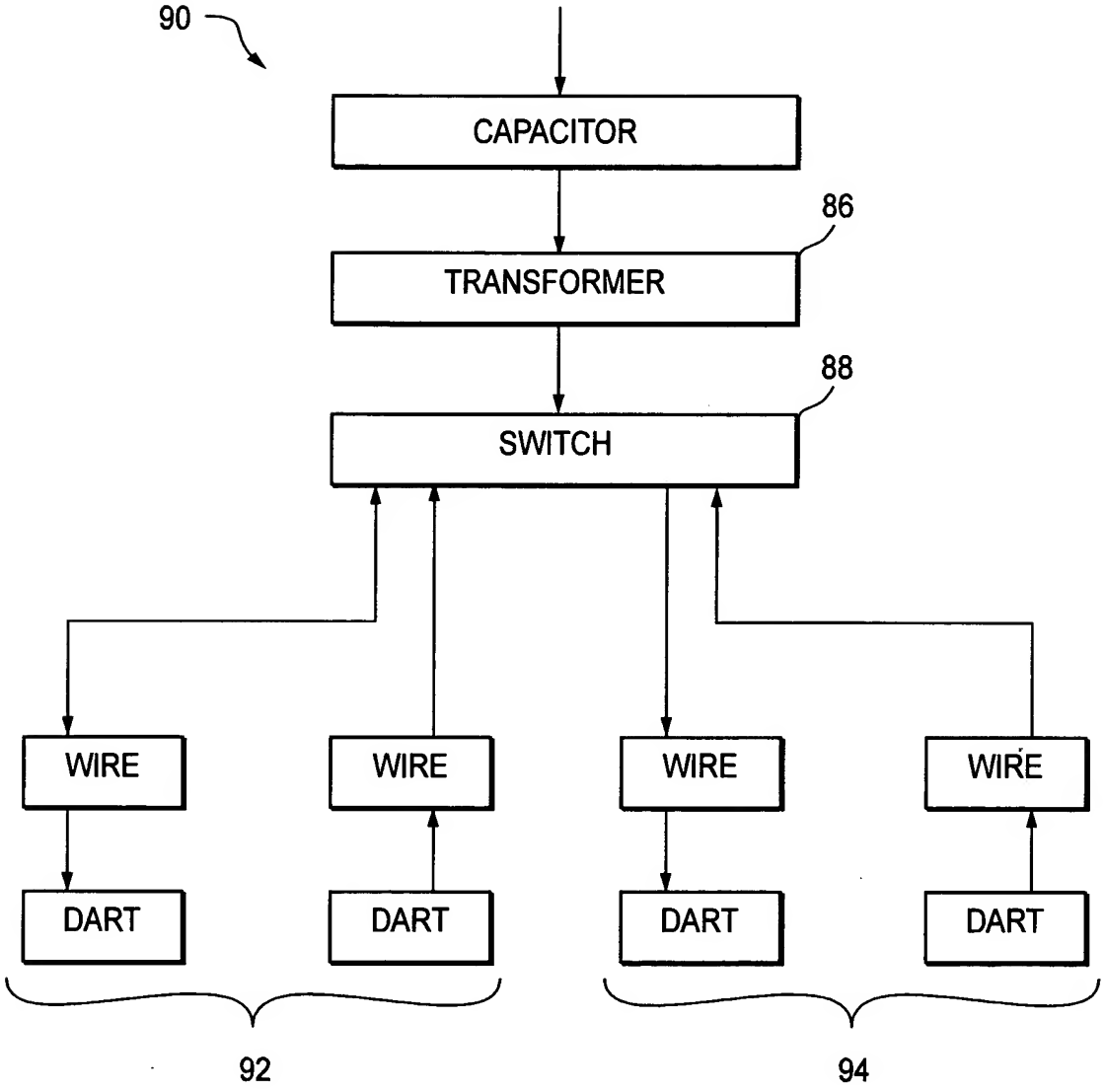

FIG. 5
(PRIOR ART)

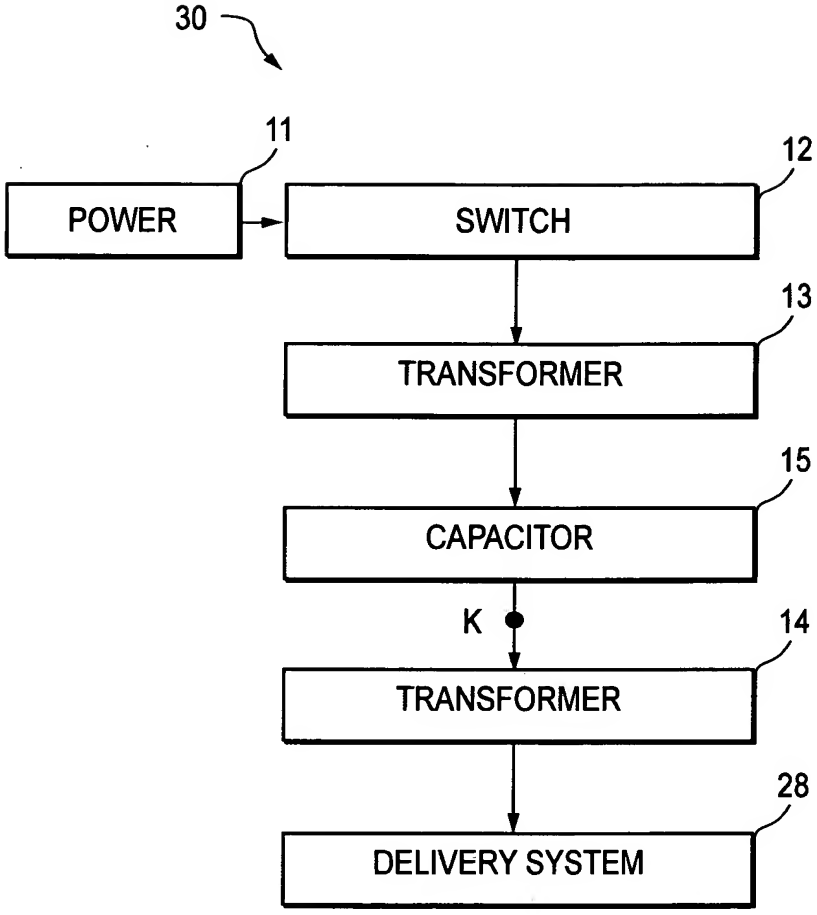
30
11
12
POWER
SWITCH
13
TRANSFORMER
15
CAPACITOR
K
14
TRANSFORMER
28
DELIVERY SYSTEM

FIG. 6A

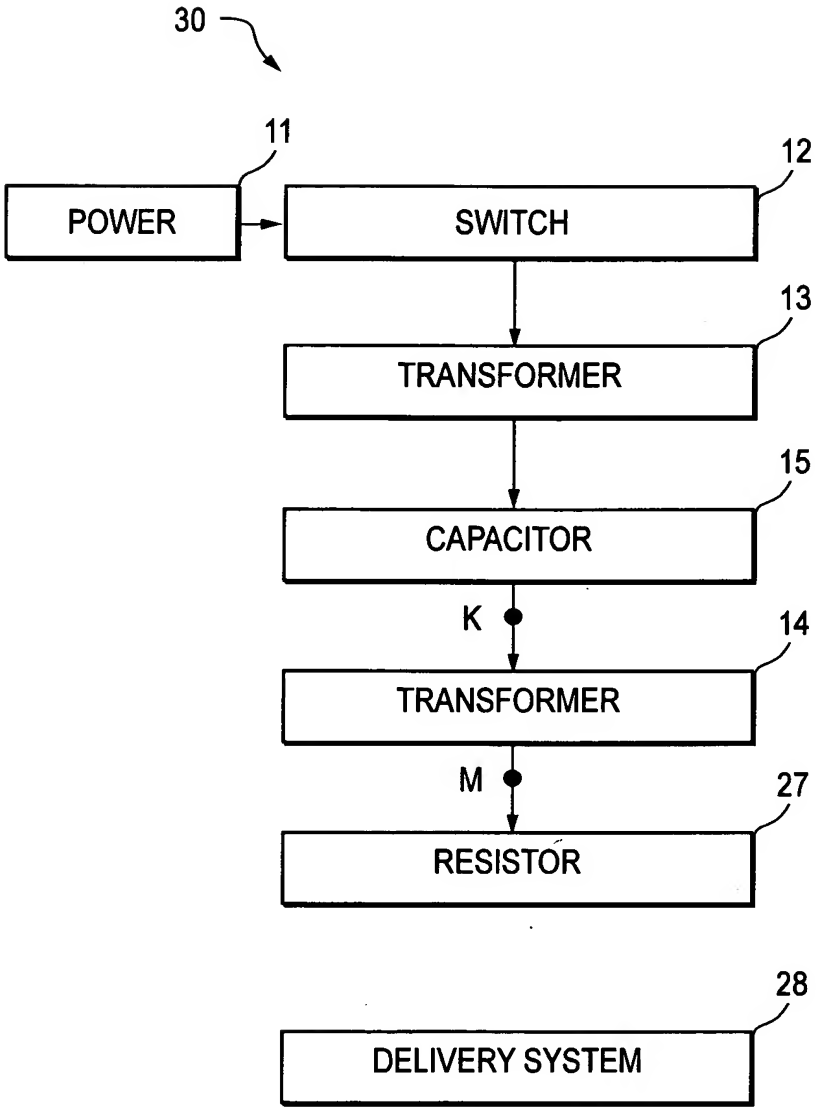
30
11
12
POWER
SWITCH
13
TRANSFORMER
15
CAPACITOR
K
14
TRANSFORMER
M
27
RESISTOR
28
DELIVERY SYSTEM

FIG. 6B